REMARKS

This paper is being submitted in response to the Office Action mailed January 3, 2005, for the above-referenced application. In this response, Applicants have cancelled claims 2 and 15 without prejudice or disclaimer of the subject matter thereof, amended claims 1, 5, 14 and 21 and added new claims 28 and 29 to clarify that which Applicants regard as the invention. Further, Applicants have amended the specification for purposes of clarification. Applicants respectfully submit that the amendments to the claims and the new claims are fully supported by the originally-filed specification and that the amendments to the specification do no add new subject matter.

The rejection of claims 1-3, 5-19 and 21-27 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,887,554 to Cohn et al. (hereinafter "Cohn") is hereby traversed and reconsideration is respectfully requested in view of the amendments to the claims contained herein. Claims 2 and 15 have been cancelled herein.

Independent claim 1, as amended herein, recites a method for providing engine operating control. The method includes reforming at least a fraction of fuel injected into an onboard fuel reformer. Reformate is injected from the onboard fuel reformer into a charge intake of an engine cylinder. Compression ignition properties of the charge intake are controlled by adjusting composition of the reformate and controlling temperature of the charge intake based on thermal content of the reformate generated from exothermicity of reactions in the onboard fuel reformer. Claims 3-13 depend directly or indirectly on independent claim 1.

Independent claim 14, as amended herein, recites a system for providing engine operating control. An onboard fuel reformer reforms at least a fraction of fuel injected therein from a fuel source. An engine having at least one cylinder receives reformate from the onboard fuel reformer as a charge intake to the engine cylinder. A control mechanism is connected to the onboard fuel reformer and controls compression ignition properties of the charge intake by adjusting composition of the reformate and controlling a temperature of the charge intake based on thermal content of the reformate generated from exothermicity of reactions in the onboard fuel reformer. Claims 16-27 depend directly or indirectly on independent claim 14.

The Cohn reference discloses a rapid response plasma fuel converter system for use in an engine. The system includes a plasma fuel converter for receiving hydrocarbon fuel, and reforming the hydrocarbon fuel into a hydrogen-rich gas, an internal combustion engine adapted to receive the hydrogen-rich gas from the plasma fuel converter, a generator powered by the engine to power the plasma fuel converter, and a power supply circuit capable of rapidly providing power to the plasma fuel converter in response to a stimulus. (See Abstract and Figure 1 of Cohn.)

Applicants independent claims recite at least the features of a method and system for engine operating control that includes *controlling compression ignition properties of the charge intake by adjusting composition of the reformate and controlling a temperature of said charge intake based on thermal content of the reformate generated from exothermicity of reactions in the onboard fuel reformer.* Applicants have recognized that thermal content of the reformate

generated from the exothermic reactions of the partial oxidation reforming process, may be used for thermal management of the air/fuel charge into the engine cylinder and can strongly affect the self-ignition of the fuel (for HCCI operation) and thus be used for ignition control. Further, the reformate gas may be used to adjust the rate of heat release through established temperature non-uniformities, resulting in a controllable rate of heat release that prevents simultaneous spontaneous ignition of all the air/fuel charge, as would be expected in a uniform premixed cylinder and which would result in unacceptable knocking. By establishing non-uniform distribution of the reformate in the cylinder, it is possible to generate conditions that enhance ignition and control rate of heat release, knock and noise. (See, for example, page 4, lines 14-18 and page 11, lines 9-24 of the present application.)

Moreover, Applicants' claims 5 and 21, as amended herein, specifically recite the additional features for a method and system as noted above that include non-uniformly distributing the reformate to establish a temperature gradient in the engine cylinder, and that offer the above-described advantages resulting from the control of the rate of heat release.

Applicants respectfully submit that the Cohn reference does not teach nor fairly suggest at least the above-noted features as claimed by Applicants. Cohn discloses a pulsed plasmatron for hydrogen rich gas production that is integrated with cylinders of an engine (see col. 8 beginning line 12 of Cohn). Applicants submit that Cohn does not disclose the control of compression ignition properties based on the adjustment of reformate composition and control of charge intake temperature generated from thermal content of the reformate from exothermicity of reactions in the reformer, as is recited by the present claimed invention. Accordingly, Applicants

respectfully request that this rejection be reconsidered and withdrawn.

Furthermore, specifically with respect to claims 5 and 21, Applicants respectfully submit that Cohn does not disclose non-uniformly distributing reformate to establish a temperature gradient in the engine cylinder to control compression ignition properties. Applicants have found that a system as presently claimed provides for enhanced control of the rate of heat release, knock and noise. Accordingly, in addition to the discussion above with respect to the independent claims, Applicants respectfully submit that these claims are patentable over the cited prior art.

The rejection of claims 4 and 20 under 35 U.S.C. 103(a) as being unpatentable over Cohn in view of U.S. Patent No. 3,425,399 to Ward et al. (hereinafter "Ward") is hereby traversed and reconsideration is respectfully requested in view of the amendments to the claims contained herein.

The features of independent claims 1 and 14 are discussed above with respect to Cohn. Claims 4 and 20 depend therefrom.

The Ward reference discloses a stratified charge gas engine utilizing a glow plug to ignite a charge. The Office Action cites Ward as showing an engine using a gaseous fuel that is stratified in the engine cylinder.

Applicants respectfully submit that Ward fails to overcome the above-noted deficiencies

of the Cohn reference with respect to Applicants' present claimed invention. Ward discloses a glow-plug ignited stratified charge gas engine in which the amount of fuel entering the engine, and hence the engine speed and power, can be controlled by regulating the pressure of the fuel entering the engine through a conduit. (See, for example, col. 4, lines 10-15 of Ward.) Ward does not disclose control of reformate composition and temperature in the manner as recited in the present claimed invention to control compression ignition properties. In Ward, a glow plug is used to ignite the fuel rather than the use of autoignition. For applications to HCCI operation, ignition should occur spontaneously at multiple points. An ignition source, such as a spark or glow plug, would result in increased emissions and reduced efficiency. Consequently, the effect of the temperature and composition of the reformate is not needed for the implementation of the objectives of Ward.

Accordingly, Applicants respectfully submit that neither Ward nor Cohn, taken alone or in any combination, teach or fairly suggest at least the features of a method and system for engine operating control that includes *controlling compression ignition properties of the charge intake by adjusting composition of the reformate and controlling a temperature of said charge intake based on thermal content of the reformate generated from exothermicity of reactions in the onboard fuel reformer*, as claimed by Applicants. In view of the above, Applicants respectfully request that this rejection be reconsidered and withdrawn.

Furthermore, specifically with respect to claims 5 and 21 as further discussed above, Applicants respectfully submit that neither Ward nor Cohn, taken alone or in any combination, disclose establishing a temperature gradient in the engine cylinder resulting from non-uniform

distribution of the reformate. Accordingly, in addition to the discussion above with respect to the independent claims, Applicants respectfully submit that these claims are patentable over the cited prior art.

Further, Applicants have added new claims 28 and 29 and respectfully submit that these claims are patentable over the cited prior art.

Based on the above, Applicants respectfully request that the Examiner reconsider and withdraw all outstanding objections and rejections. Favorable consideration and allowance are earnestly solicited. Should there be any questions after reviewing this paper, the Examiner is invited to contact the undersigned at 617-248-4792.

Respectfully submitted,
CHOATE, HALL & STEWART LLP

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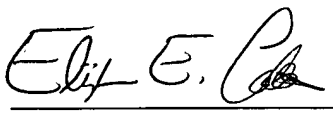

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